its depth distribution and determine the range of electrons and the energy of the particles.

During irradiation, the accumulated charge and its depth distribution in aluminum are measured. Further, according to the empirical formula, a calculation of the energy is carried out according to a certain projective range.

At the moment leakage currents and electrical breakdowns between the plates have a significant impact on the result. It is demand the selection of dielectric for elimination this problem. The dielectric material must be able to withstand severe external conditions: high temperature and the disrupt effects of ionization radiation.

ENZYMATIC TREATMENT TO INCREASE EXTRACT YIELD FROM CHLORELLA ALGAE

YAMA I.*, Kovaleva E.G.

Institute of Chemical Engineering, Ural Federal University, Yekaterinburg, Russia

E-mail: uktr017@gmail.com

Algae has shown to contain bioactive compounds which is of interest for researchers in different fields. Feasible extraction methods are essential for researchers to perform their experiments on those bioactive compounds and for industry for mass production. The use of enzymes to pre-treat algae before extraction lead to much better yield and higher quality extract [1].

Chlorella is a single cell green algae. Chlorella growth factors are a group of water soluble proteins and peptides found in the algae which have proved to be of interest for researchers due to their biological activity in different fields [2]. Water extraction is the usual extraction method used in industry to extract Chlorella growth factors . We studied the effect of pre-treatment of the algae with Cellolux-A enzymatic preparation on the outcome of water extraction and to find the most efficient enzymatic treatment time.

Dry Chlorella powder and water as a solvent have been used to prepare extracts. Hot water at T=95°C is used for 20 minutes to make the extraction. The final extracts were subjected to spectrophotometer analysis at 260 nm (Shimadzu U-1800, Japan). Other samples were prepared by treating them with Cellolux-A enzyme (Sibbiopharm, Russia) in different time. They were then processed with hot water the same as before. The final extracts were measured using spectrophotometer Shimadzu U-1800 (Japan) at the same wavelength to compare them with non-treated samples and to compare between the different treatment time applied.

Enzymatic pre-treatment has dramatically increased the final quality of extract. Growth factors content is calculated based on spectrophotometer analysis and the weight of solid extracted materials in the sample and shown in Table 1 .

Table1. GF Index for samples with enzymatic treatment and for non-treated ones

Sample	Temperature, °C	Enzyme weight, g	pH	Solid recovery, g	Absorbance at 260 nm	GF Index
1	95	0	5	0.446	0.27	3.0
2	95	0	5	0.313	0.293	2.3
3	95	0.06	5	0.696	0.442	7.7
4	95	0.06	5	0.644	0.443	7.1

Enzymatic treatment has doubled the growth factors index and increased solid recovery. Another test was made to find the optimum time for treatment, and the samples were prepared under the exact conditions, while changing the time of pre-treatment (Table 2). The sample without enzymatic treatment was prepared to ensure the validity of the results.

Table 2. GF Index for samples prepared at different pre-treatment times

Sample	Treatment time, min	Enzyme weight, g	pH	Solid recovery, g	Absorbance at 260 nm	GF Index
D1	120	0	5	0.189	0.327	3.1
D2	30	0.03	5	0.089	0.355	1.6
D3	60	0.03	5	0.23	0.452	5.2
D4	120	0.03	5	0.3135	0.488	7.6

The treatment period of 2 hours was found to show a significant result in GF index compared to that for other samples. The1 hour treatment increased GFI by 68% while the 2 hours one did it by 145% . It means that the extra hour treatment resulted in 77% more GFI .

The enzymatic pre-treatment proved much better extract quality. It can be considered to be more effective method in extracting GF in industry and it also provide researchers with higher quality extract which may lead to better results in its bioactivity.

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